GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2022-2023

Exploration Geophysics (C002645)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size *(nominal values; actual values may depend on programme)*

Credits 6.0 **Study time 150 h** **Contact hrs** 60.0 h

Course offerings and teaching methods in academic year 2022-2023

A (semester 1)	English	Gent	fieldwork	10.0 h
			project	2.5 h
			integration seminar	2.5 h
			seminar: practical PC room classes	22.5 h
			lecture	22.5 h

Lecturers in academic year 2022-2023

Van Rooij, David	WE13	lecturer-in-charge
Hermans, Thomas	WE13	co-lecturer

Offered in the following programmes in 2022-2023	**crdts**	**offering**
Master of Science in Teaching in Science and Technology (main subject Geology)	6	A
Master of Science in Geology	6	A
Master of Science in Geology	6	A
Exchange programme in Geology (master's level)	6	A

Teaching languages

English

Keywords

Exploration geophysics, geophysical prospecting, applied geophysics

Position of the course

This course offers an overview of the basic principles, methods and techniques for geophysical exploration, both in the framework of fundamental studies and of industrial applications (groundwater, geothermal resources, ore prospection, hydrocarbon exploration,...).
During the course, we will focus on the understanding of the different methods, specifically with respect to the limitations and boundary conditions for practical use in the field. Also, attention will be paid to the processing of the data, the recognition of artefacts and the integration of other methods.

Contents

- Overview of geophysical exploration techniques and of an exploration strategy, limitations, societal aspects, data acquisition and sampling
- Gravimetric methods
- Magnetic exploration
- Seismic techniques: refraction and reflection seismics
- Electrical methods: self potential, resistivity (VES, CSR, ERT, borehole), IP
- Electromagnetic methods and GPR
- Applications in downhole logging (gamma radiation, caliper, strike & dip)
- Radiometric methods
- Student presentations (integration seminar)

Initial competences

The student succesfully passed geophysics (3Ba) and has a basis of general geology, acquired in the bachelor years.

Final competences

1 The student has an overview of modern geophysical exploration techniques and of their basic principles, and has acquired basic interpretational skills.
2 The student has acquired the competence to design a multidisciplinary and multi-scale exploration strategy both for imaging sedimentary basins and for the exploration of sites of an exceptional fundamental or economical value.
3 The student has acquired general scientific and intellectual competences, as well as ethical and social aspects.
4 The student understands the influence of the measuring parameters on the quality and accuracy of the geophysical data.
5 The student develops skills for a multidisciplinary interpretation of geophysical data, as well as to integrate them with other geological data.
6 The student can independantly carry out geophysical and borehole measurements in a professional context.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture, integration seminar, project, fieldwork, seminar: practical PC room classes

Extra information on the teaching methods

- The field work entails several afternoon during which a practical "know-how" introduction will be given on some of the most-used geophysical tools for the detection of geological and anthropogenic structures.
- The practical exercises comprise the PC-based processing and interpretation of data acquired during the field work or from educational datasets. All practical exercises are concluded with a short report.
- The project concerns the presentation and critical discussion of an exploration geophysical project, published in a specialized journal
- The integration seminar concerns the analysis and interpretation of a geophysical dataset, published in a specialized journal.

Learning materials and price

- Powerpoint slides are based and continuing on the handbook, available through Ufora.
- English handbook: John M. Reynolds (2011). An Introduction to Applied and Environmental Geophysics (2nd edition). Wiley-Blackwell, 712 pp. ISBN 978-0-471-48536-0. Estimated cost: 60 euro (not mandatory)

References

- Kearey et al. (2002). An introduction to geophysical exploration (3rd edition). John Wiley and Sons Ltd, 272 pp.
- Burger, H.R., Sheehan, A.F., Jones, C.H. (2006). Exploring the shallow subsurface. Norton & Company, 554 pp.
- Young, R.A. (2004). A Lab Manual of Seismic Reflection Processing. EAGE Publications, Houten, 126 pp.
- Gadallah, M. & Fisher, R. (2009). Exploration Geophysics. Springer-Verlag, Berlin Heidelberg, 262 pp.
- Repsold, H. 1989. Well Logging in Groundwater Development. International Contributions to Hydrogeology. International Association of Hydrogeologists. Volume 9.
- Reynolds, J.M. (2011). An Introduction to Applied and Environmental Geophysics, 2nd Edition. Wiley-Blackwell. ISBN: 978-0-471-48535-3

Course content-related study coaching

Students are coached by the lecturer, assisted by postdoctoral and doctoral researchers.

Evaluation methods

end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period

Written examination with open questions, oral examination

Examination methods in case of periodic evaluation during the second examination period

Written examination with open questions, oral examination

Examination methods in case of permanent evaluation

Participation, assignment, report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

Extra information on the examination methods

Examinations are written with 10 short one open questions. The objective is to assess the skills of the student to select the right method for the right application, and to put results into the right perspective.
The oral question will assess the ability to draft an exploration strategy.
The project is evaluated based upon the drafting of an abstract, as well as its presentation and discussion.
The reports are handed in after the practical exercises and combine field notes with a short report on data processing and a short interpretation.

Calculation of the examination mark

The periodic evaluation constitutes 40% of the examination mark, whereas the non-periodic evaluation takes account for 60%, provided that the student did not fail any of the separate components (with a score below 8/20)". When the student obtains less than 8/20 for at least one of the components, they can no longer obtain a pass mark for the course unit as a whole. If the total score does turn out to be a mark of ten or more out of twenty, this is reduced to the highest fail mark (i.e. 9/20);
Unlawful absence during the practical exercises and fieldwork will lead to a total score (theory & practicals) of maximum 7/20, regardless the scores of the theory.
In case of non-participation to the evaluation of one ore more parts, one cannot pass for the course. The final score, when higher than 7/20, will be reduced to 7/20.